

1 FRONT SUSPENSION TUNING APPARATUS FOR VEHICLE WITH STRUTS

2 FIELD OF THE INVENTION

3 The present invention relates to a device for quickly and
4 easily adjusting the caster and camber of a vehicle front
5 suspension across a broader than normal range to tune the
6 vehicle's suspension for racing and/or high performance street
7 applications.

8
9 BACKGROUND OF THE INVENTION

10 The versatility and performance of newer muscle cars such
11 as the FORD MUSTANG permit owners to use one vehicle for
12 multiple purposes. Often the same vehicle used to carry
13 groceries home from the supermarket is used for racing
14 applications on the weekend. Owners will often modify their
15 vehicle to make it more competitive in their chosen form of
16 racing. One of the most modified areas of a vehicle for racing
17 applications is the suspension.

18 Front suspension tuning can be one of the most critical
19 aspects of getting a vehicle to handle properly for either
20 street or racing applications. Unfortunately, front
21 suspensions that are modified exclusively for racing typically
22 will not work properly for street driving, and street
23 suspensions typically do not work well for racing. One of the
24 biggest challenges for a muscle car owner who races his

1 vehicle has been to balance the vehicle for both uses.

2 The front wheel of a vehicle has three main alignment
3 angles: camber, caster, and toe. Camber is the angle at which
4 the top of the tire is tilted inwardly or outwardly, as viewed
5 from the front of the car. If the top of the tires lean toward
6 the center of the car you have negative camber. If the top of
7 the tires are tilted outward you have positive camber.
8 Typically, as the tires are turned left and right, the camber
9 changes slightly because the pivoting points for the tires are
10 not vertical as viewed from the side. Adjusting camber can
11 have a dramatic affect on the cornering characteristics of a
12 vehicle. For example, an oval track racer will often race with
13 negative camber on the right side of the vehicle and positive
14 camber on the left side of the vehicle. A drag racer will
15 often race with neutral or slightly negative camber on both
16 sides of the vehicle and a street vehicle will typically have
17 camber set at zero or perpendicular to the street surface.

18 Caster is the angle at which the pivot points for tires
19 are tilted, as viewed from the side. Caster is best understood
20 by imagining an axis running through the uppermost wheel pivot
21 and extending through the lowermost pivot. From the side, if
22 the top of the axis tilts toward the back of the car you have
23 positive caster, if the axis line tilts toward the front of the
24 car you have negative caster. If a vehicle has positive

1 caster, the uppermost pivot is behind the lower pivot and this
2 causes the tire to tilt in more at the top as the tire is
3 steered inward (camber gain).

4 Changing caster primarily affects four things, high speed
5 stability, camber gain, bump steer characteristics and relative
6 corner weights (wedge). Increasing caster generally increases
7 straight line directional stability. This is good for an
8 application such as drag racing, however, other parameters such
9 as bump steer and wedge may be adversely affected making
10 handling for applications such as street driving or road racing
11 unacceptable. Excessive caster settings will increase required
12 steering effort, cause excessive tire wear and reduce braking
13 ability. Negative caster requires less steering effort but
14 directional stability is adversely affected. Some racing
15 applications may require different caster settings on each side
16 of the vehicle. For example, oval track racers often run more
17 positive caster on the right side wheel than the left. The
18 caster split helps pull the car down into the turn, helps the
19 car turn in the center of the turn, and helps the car maintain
20 traction exiting the turn.

21 Accordingly, what is lacking in the art is a suspension
22 tuning kit for vehicles with struts. The suspension tuning kit
23 should achieve objectives such as providing: quick adjustment,
24 increased suspension rigidity, increased range of adjustability

1 and reliable performance. The suspension tuning kit should
2 include packaging flexibility for installation on various
3 vehicle configurations including retrofitting existing vehicles
4 with minimal modification of the original suspension system.
5 The suspension tuning kit should facilitate independent caster
6 and camber adjustment of each front wheel across the extended
7 range. The suspension tuning kit should facilitate quick
8 suspension changes to allow a vehicle to be driven to a
9 racetrack, converted to a race setup and thereafter quickly
10 converted back to a street driving setup for the trip home.

1 DESCRIPTION OF THE PRIOR ART

2 A number of prior art systems exist for adjusting the
3 caster and/or camber of a vehicle which utilizes struts. Most
4 of the systems utilize a combination of thin stamped metal
5 plates and rubber bushings, while others use eccentric cams or
6 jack bolts.

7 U.S. Patent No. 4,372,575 teaches a vehicle wheel
8 suspension including a strut member provided at its lower end
9 with a wheel spindle and a connection with a lateral lower
10 control arm. The device further includes mounting apparatus
11 for attaching the upper end of the strut to a stamped sheet
12 metal tower portion of the vehicle and provisions for
13 adjustment of either wheel caster or wheel camber via a stamped
14 sheet metal adjuster attached to the upper end of the strut.

15 U.S. Patent No. 4,946,188 teaches an adjustment mechanism
16 for a MacPherson strut of an automobile. The adjustment is
17 provided by modifying the top bearing retainer to provide an
18 inward circular lip. Two plates are clamped to this lip.
19 Before clamping, the plates are rotatable relative to the
20 bearing retainer so that the center of an eccentric hole
21 therein moves along a circle which is concentric to the bearing
22 retainer and thus the bearing. The upper end of the piston rod
23 of the strut is mounted in the eccentric hole so that the
24 position of the upper end of the strut can be moved relative to

1 the body and also within the bearing and helical spring.

2 U.S. Patent No. 5,484,161 teaches an adjustable mount for
3 the upper end of a motor vehicle suspension strut, wherein a
4 flange is located between a clamping plate and a face plate
5 with studs passing from the clamping plate through enlarged
6 apertures in the flange. Holes in the face plate and aligned
7 holes in the top of the vehicle chassis suspension tower are
8 securable by nuts. Before the nuts are tightened, the flange
9 may be moved in a sliding fashion between the clamping plate
10 and face plate to locate the bushing and upper end of the strut
11 into the desired location for correct caster and camber
12 settings. Reference is also made to the provision of
13 screwdriver slots to permit the flange to be levered into the
14 desired location using a screwdriver when the suspension is
15 under load.

16 U.S. Patent No. 5,931,485 teaches a support arrangement
17 for a steered vehicle wheel mounted on a wheel carrier which is
18 supported by a transverse link by way of a ball joint with a
19 flange pivotally supported and mounted on the transverse link
20 by clamping screws extending through spaced mounting holes in
21 the transverse link and the mounting flange. The mounting
22 holes in one of the transverse link and mounting flange is
23 formed by at least three different receiving bores disposed at
24 different distances from the pivot point of the flange for

1 receiving the clamping screws and the mounting holes. In the
2 other are holes elongated along a line extending through the
3 pivot point between the transverse link and the flange and
4 forming jointly with the screws stops which provide for
5 positive engagement between the transverse link and the flange
6 in each of the different relative pivot positions between the
7 two.

8 U.S. Patent No. 6,224,075 teaches a caster adjuster for a
9 motor vehicle suspension, typically having a wishbone. The
10 device is made adjustable by mounting the suspension upright
11 ball joint in a housing having an offset spigot rotatable by an
12 Allen key engaged in the spigot to move the ball joint backward
13 and forward while the spigot is restrained by a slot in a
14 location bracket engaged with the wishbone. Camber is adjusted
15 by a threaded adjuster operable between the location bracket
16 and the housing while allowing rotation of the housing relative
17 to the bracket.

18 U.S. Patent No. 6,257,601 teaches an adjustable strut
19 mounting plate for correcting at least one alignment parameter
20 of a motor vehicle wheel assembly, with the adjustable strut
21 mounting plate comprising an annular body adapted for secure
22 attachment to the original strut mounting plate of the motor
23 vehicle. The adjustable strut mounting plate includes a
24 plurality of elongated ribbed adjustment bores through which

1 bolts pass to secure the original strut mounting plate to the
2 adjustable mounting plate. In addition, right hand and left
3 hand tower mounting bores are provided in the adjustable strut
4 mounting plate to accommodate attachment of the combined
5 adjustable strut plate with the original strut plate to the
6 vehicle tower.

7 U.S. Patent No. 6,328,321 teaches an adjustable mount for
8 the upper end of a vehicle suspension strut allowing the strut
9 to be relocated relative to a vehicle chassis member. The
10 mount comprises a bush adapted to receive and secure the upper
11 end of the strut, a flange extending radially outwardly from
12 the bush, and a clamping plate adapted to abut the lower face
13 of the flange. The flange has upper and lower faces, and the
14 clamping plate has an opening therethrough larger than the
15 perimeter of the bush such that the clamping plate can
16 relatively slide over the lower face of the flange over a
17 limited area. A plurality of studs extend upwardly from the
18 clamping plate. The studs are located outside the periphery of
19 the flange and restrict the sliding movement of the flange
20 relative to the clamping plate by engagement with the periphery
21 of the flange.

22 U.S. Patent No. 6,485,223 teaches a caster-camber plate
23 assembly which includes a base plate, a main plate and a strut

1 top mounting plate. The base plate includes four spaced apart
2 main plate fastening members attached thereto. The main plate
3 includes four spaced apart strut top mounting plate fastening
4 members attached thereto. The main plate has the main plate
5 fastening members extending therethrough for attaching the base
6 plate adjacent to a first side of the main plate and is capable
7 of being moved with respect to the base plate along a first
8 translation axis. The strut top mounting plate is positioned
9 adjacent to the main plate with the four strut top mounting
10 plate fastening members extending therethrough. The strut top
11 mounting plate is capable of being moved with respect to the
12 main plate along a second translation axis. The second
13 translation axis extends approximately perpendicular to the
14 first translation axis. A central axis of the strut top
15 mounting plate is positioned within an area defined between the
16 main plate fastening members and within an area defined between
17 said strut top mounting plate fastening members.

18 The construction of this device places the strut mount
19 plate on top of the main plate, whereby a catastrophic fastener
20 failure will result in the strut being thrust through the
21 vehicle hood and loss of vehicle control. Moreover, the strut
22 mounting position (height) within this device prevents the
23 strut from being positioned at the original equipment
24 manufacturers (OEM) suggested height. Still yet this

1 construction requires spacers between the main plate and the
2 strut tower to accommodate the heads of the fasteners. The
3 spacers reduce the contact area between the main plate and the
4 strut tower thereby reducing rigidity of the vehicle front
5 suspension.

6 As disclosed, the above devices fail to teach or suggest
7 a suspension tuning mechanism capable of the large range of
8 caster and/or camber adjustments required for high performance
9 applications. The prior art is also deficient in teaching a
10 suspension tuning mechanism capable of providing the caster
11 and/or camber travel required to properly align the front
12 wheels of vehicles having lowered ride heights. Still further,
13 the prior art devices do not provide the suspension rigidity
14 and stability required by high performance and/or racing
15 vehicles.

16

1 **SUMMARY OF THE INVENTION**

2 The present invention provides a suspension tuning device
3 for vehicles with struts. More specifically the suspension
4 tuning device generally comprises an upper plate, two lower
5 plates and a strut mounting plate. The plates are constructed
6 to mount juxtaposed to a standard strut tower to permit quick
7 front suspension alterations throughout an increased range when
8 compared to the prior art.

9 The pre-existing vehicle strut tower includes a thin sheet
10 metal mounting member constructed for attaching the upper
11 portion of a strut member via a stamped metal plate. The
12 mounting member typically includes three elongated slots
13 arranged to cooperate with the stamped metal plate to permit
14 the upper portion of the strut member to be pivoted inward for
15 a small amount of camber adjustment. The prior art
16 caster/camber adjustment combination provides only a small
17 amount of adjustment and typically requires the strut to be
18 uncoupled or unloaded to complete the adjustment.

19 The instant invention provides a suspension tuning kit
20 which replaces the stamped metal strut attachment plate of the
21 prior art. The upper plate of the instant invention is
22 constructed of billet aluminum and includes increased thickness
23 when compared to the prior art. The upper plate includes a top
24 surface and a bottom surface, the bottom surface positioned

1 juxtaposed to the upper surface of the strut tower to increase
2 the rigidity of the strut tower. The upper plate also includes
3 an outer contoured perimeter and at least one rounded lower
4 corner which allow the plate to be moved over a broad range
5 without interference from the inner fender wall. The upper
6 plate includes four camber adjustment slots extending through
7 the plate with one slot being substantially longer than the
8 other three. The shorter slots are constructed and arranged to
9 cooperate with the existing three camber adjustment slots in
10 the mounting member of the strut tower to permit extended
11 travel. The longer slot cooperates with a round aperture which
12 is drilled through the mounting surface of the strut tower.
13 The longer slot and the added fastener further increase
14 rigidity and stability of the assembly.

15 The upper plate also includes a contoured cavity which
16 extends upward into the upper plate from the bottom surface.
17 The cavity includes a centrally located oval shaped aperture
18 and a plurality of elongated caster adjustment slots arranged
19 substantially transverse to the camber adjustment slots. The
20 contoured cavity and the oval aperture cooperate to partially
21 enclose the strut mounting plate while still permitting the
22 strut mounting plate to slide for caster adjustment. Partially
23 enclosing the strut mounting plate prevents the upper portion

1 of the strut from becoming loose in the event of a fastener
2 failure.

3 The strut mounting plate is preferably machined from a
4 steel billet and includes a flat plate portion and a centrally
5 located upwardly extending boss. The flat plate portion
6 includes a plurality of threaded apertures arranged to align
7 with the elongated caster slots in the upper plate. Fasteners
8 extend through the elongated caster slots in the upper plate
9 and threadably engage the threaded apertures to secure the
10 mounting plate in a predetermined position with respect to the
11 upper plate. The boss includes a centrally located bore
12 adapted to secure the upper end of a strut. The bore may
13 optionally include a resilient isolation element or a
14 hemispherical element for allowing the strut to pivot a
15 predetermined amount.

16 The first lower plate is generally L-shaped and preferably
17 includes three studs affixed substantially perpendicular with
18 respect to one of the side faces. The first lower plate is
19 located juxtaposed to the lower surface of the mounting portion
20 of the strut tower with the studs extending through the pre-
21 existing slots in the mounting member of the strut tower and
22 the three short slots in the upper plate. Three threaded nuts
23 cooperate with the threaded studs extending through the upper

1 plate to allow the upper plate to be secured in a selected
2 position with respect to the strut tower.

3 The second lower plate is generally rectangular and
4 includes one stud affixed substantially perpendicular to one
5 side thereof. The second lower plate is also located
6 juxtaposed to the lower surface of the mounting member of the
7 strut tower with the stud extending through the drilled
8 aperture and the long slot in the upper plate. The second
9 lower plate may also include a means of attaching the second
10 lower plate to the strut tower to prevent rotation thereof
11 during adjustment of the upper plate. A threaded nut
12 cooperates with the threaded stud extending through the drilled
13 aperture and the upper plate to allow the upper plate to be
14 secured in a selected position with respect to the strut tower.
15 The first and second lower plates cooperate with the upper
16 plate to sandwich the mounting member of the strut tower adding
17 significant rigidity and stability to the assembly when
18 compared to the prior art.

19 The suspension tuning kit may be installed on either one
20 or both sides of the front suspension of the vehicle and each
21 strut may be independently adjusted to suit the drivers needs.

22 Accordingly, it is an objective of the present invention
23 to provide a suspension tuning kit for vehicles with struts.

1 Yet an additional objective of the present invention is to
2 provide a suspension tuning kit for vehicles with struts which
3 allows rapid suspension changes without disconnection of the strut.

4 It is a further objective of the present invention to
5 provide a suspension tuning kit for vehicles with struts that
6 allows an increased range of adjustment when compared to prior
7 art devices.

8 A still further objective of the present invention is to
9 provide a suspension tuning kit for vehicles with struts which
10 includes sandwich construction and additional fasteners to
11 provide additional rigidity and support to the vehicle
12 suspension system.

13 Another objective of the present invention is to provide
14 a suspension tuning kit for vehicles with struts which is
15 simple to install and which is ideally suited for original
16 equipment and aftermarket installations.

17 Yet another objective of the present invention is to
18 provide a suspension tuning kit for vehicles with struts that
19 can be inexpensively manufactured and which is simple and
20 reliable in operation.

21 Still another objective of this invention is to provide a
22 suspension tuning kit for vehicles with struts or coil over
23 shocks which utilizes a two piece base plate construction.

1 Still yet another objective of the instant invention is to
2 provide a suspension tuning kit for vehicles with struts which
3 maintains limited control of the strut or coil over shock in
4 the event of a strut mounting plate fastener failure.

5 Other objects and advantages of this invention will become
6 apparent from the following description taken in conjunction
7 with the accompanying drawings wherein are set forth, by way of
8 illustration and example, certain embodiments of this
9 invention. The drawings constitute a part of this
10 specification and include exemplary embodiments of the present
11 invention and illustrate various objects and features thereof.

1 BRIEF DESCRIPTION OF THE FIGURES

2 Figure 1 is a perspective view illustrating the front
3 portion of a vehicle equipped with strut front suspension;

4 Figure 2 is a perspective exploded view of the instant
5 invention and a portion of the strut tower mounting member of
6 the vehicle illustrated in Figure 1;

7 Figure 3 is a top view of the upper plate of the instant
8 invention;

9 Figure 4 is a section view of the upper plate taken along
10 lines 1-1 of Figure 3;

11 Figure 5 is a bottom perspective view of the upper plate
12 shown in Figure 3;

13 Figure 6 is a perspective view of the strut mounting
14 member of the instant invention;

15 Figure 7 is a top view of the first lower plate of the
16 instant invention;

17 Figure 8 is a side view of the first lower plate of the
18 instant invention;

19 Figure 9 is a a top view of the second lower plate of the
20 instant invention;

21 Figure 10 is a side view of the second lower plate of the
22 instant invention.

23

24

1 DETAILED DESCRIPTION OF THE INVENTION

2 Although the invention is described in terms of a
3 preferred specific embodiment, it will be readily apparent to
4 those skilled in this art that various modifications,
5 rearrangements and substitutions can be made without departing
6 from the spirit of the invention. The scope of the invention
7 is defined by the claims appended hereto.

8 Referring to Figure 1, the front portion of a vehicle 10
9 equipped with a strut suspension is shown. The strut
10 suspension 12 includes a pair of strut towers 14. The strut
11 towers are typically formed from sheet metal by methods well
12 known in the art and are secured to the inner fender wall
13 structure 18 on both the left side 20 and right side 22 of the
14 vehicle. Each strut tower includes a mounting member 24
15 oriented in a plane substantially orthogonal with respect to
16 the longitudinal axis 32 of the corresponding strut 16. The
17 mounting member 24 generally includes a strut aperture 26 and
18 three elongated camber adjustment slots 28. The elongated
19 camber adjustment slots are arranged generally parallel with
20 respect to each other and spaced around the strut axis 32. The
21 upper end of a strut member 16 is secured to the mounting
22 member via a stamped sheet metal member 30. The sheet metal
23 member 30 cooperates with the three camber adjustment slots 28
24 to permit the upper end of the strut member to be pivoted

1 inward toward the center of the car for a small amount of
2 camber adjustment.

3 Referring to Figure 2, an exploded view of the instant
4 invention is illustrated. The instant invention provides a
5 suspension tuning kit 100 which replaces the stamped metal
6 strut attachment plate 30 (Figure 1) of the prior art. The
7 suspension tuning kit 100 comprises an upper plate 102, a strut
8 mounting plate 104, a first lower plate 106 and a second lower
9 plate 108.

10 Referring to Figures 2-5, the upper plate 102 is
11 illustrated. The upper plate 102 includes an outer contoured
12 edge 120, a top surface 114, a bottom surface 116 and at least
13 one rounded bottom corner 122. In a most preferred and non-
14 limiting embodiment, the upper plate is constructed of aluminum
15 and is about 0.590 of an inch thick. It should be appreciated
16 that the upper plate may be made thinner or thicker as the
17 space requirements, materials and wheel loads require. The
18 upper plate may alternatively be made from other metals which
19 may include, but should not be limited to steel, titanium or
20 suitable combinations thereof. The contoured outer edge 120
21 and the rounded bottom corner 122 cooperate to allow the upper
22 plate 102 to be moved over a broad range while assembled
23 juxtaposed to the upper surface to the strut tower without
24 interference between the upper plate 102 and the inner fender

1 wall 18. The radiused lower corner 122 is particularly adapted
2 to allow the upper plate 102 to abut the fillet where the inner
3 fender wall 18 and strut tower 14 (Figure 1) are joined. The
4 upper plate 102 includes four secondary camber adjustment slots
5 118, 124 extending through the upper plate with one secondary
6 camber adjustment slot 124 being substantially longer than the
7 other three. The shorter slots 118 are constructed and
8 arranged to cooperate with the existing three camber adjustment
9 slots 28 in the mounting member 24 of the strut tower 14. The
10 longer slot 124 cooperates with a round aperture 126 (Figure 2)
11 which is drilled through the mounting surface 24 of the strut
12 tower 14. In the preferred embodiment the existing camber
13 adjustment slots 28 cooperate with the secondary camber
14 adjustment slots 118, 124 to allow about three degrees of
15 camber adjustment. In a most preferred embodiment the camber
16 adjustment slots are constructed and arranged to allow wheel
17 camber to be adjusted between about 0 degrees and about -3
18 degrees.

19 The upper plate 102 also includes a contoured cavity 126
20 which extends upward into the bottom surface 116 and a
21 centrally located oval shaped aperture 128. The contoured
22 cavity 126 and the oval aperture 128 cooperate to partially
23 enclose the strut mounting plate while permitting caster
24 adjustment with or without disconnection of the strut member 16

(Figure 1). In a most preferred non-limiting embodiment, the cavity extends about 0.300 of an inch into the upper plate. It should also be appreciated that the cavity depth may be varied to accommodate space, material and wheel load requirements. At least two caster adjustment slots 130, 131 extend through the top surface 114 into the cavity 126 and are arranged to have substantially transverse axis to the camber adjustment slots 118 and 124. In the preferred embodiment one of the caster adjustment slots 131 is longer than caster adjustment slot 130. The longer caster adjustment slot 131 is constructed and arranged to accommodate two spaced apart fasteners for increased securement of the strut mounting plate. In the preferred embodiment the caster adjustment slots 130, 131 are constructed and arranged to allow about 3 degrees of adjustment. In a most preferred embodiment, the caster adjustment slots allow the caster to be adjusted between about +4 degrees to about +7 degrees.

Referring to Figure 6, a strut mounting plate 104 is illustrated. In the preferred embodiment, the strut mounting plate includes a flat plate portion 132 and an integrally formed upwardly extending boss 134. The outer edge 138 of the flat plate portion is contoured and sized to fit into the upper plate cavity 126 (Figure 5). The flat plate portion includes at least two and preferably three threaded apertures 136. The

1 apertures are arranged to align with the caster adjustment
2 slots 130, 131 in the upper plate 102. A plurality of threaded
3 fasteners (not shown) extend through the upper plate caster
4 slots 130, 131 and cooperate with the threaded apertures 136 to
5 permit the strut mounting plate to be secured in a desired
6 position with respect to the upper plate. In a most preferred
7 embodiment the flat plate portion is about 0.285 of an inch
8 thick. The thickness of the flat plate portion and the upper
9 plate cavity depth cooperate to allow the strut mounting plate
10 to be slid into a desired caster position while the upper plate
11 is secured in place with respect to the strut tower. The
12 upwardly extending boss 134 includes a bore 140 extending
13 therethrough. The bore is constructed and arranged to secure
14 the upper end of a strut member 16 (Figure 1). In the
15 preferred embodiment the bore 140 includes a resilient member
16 or hemispherical member (not shown). Snap rings, well known in
17 the art, cooperate with an upper snap ring groove 142 and a
18 lower snap ring groove 144 to retain the resilient or
19 hemispherical member within the bore. The resilient member and
20 the hemispherical member are constructed and arranged to
21 cooperate with the upper end of the strut member 16 to allow
22 the strut member to pivot a predetermined amount.

23 The strut mounting plate 104 is preferably machined as a
24 single piece from a metal such as steel. However, other

1 materials such as aluminum and/or titanium may also be used.
2 In addition, the strut mounting plate may be made from a
3 plurality of pieces and attached together by methods well known
4 in the art.

5 Referring to Figures 7-8, the first lower plate 106 is
6 illustrated. The first lower plate is generally L-shaped and
7 includes three fastener apertures 146 therethrough. The three
8 fastener apertures are constructed and arranged to align with
9 the strut tower camber slots 28 and the upper plate camber
10 adjustment slots 118 (Figure 2). In the preferred embodiment
11 a first group of threaded fasteners 148 extend through the
12 fastener apertures 146 and the heads are secured to the lower
13 side face 152 via weldment. The first lower plate 106 is
14 positioned parallel and juxtaposed to the bottom surface of the
15 mounting member 24 of the strut tower 14. The first group of
16 threaded fasteners 148 have sufficient length to extend through
17 the mounting member of the strut tower and the upper plate. At
18 least three threaded nuts (Not shown) cooperate with said first
19 group of fasteners to secure the upper plate in a selected
20 position with respect to the strut tower.

21 Referring to Figures 9-10, the second lower plate 154 is
22 illustrated. The second lower plate is generally rectangular
23 and includes a beveled corner 156 and at least one aperture
24 146. In the preferred embodiment a fourth threaded fastener

1 148 extends through the fastener aperture 146 and the head of
2 the fastener is secured to the lower side face 158 via
3 weldment. The second lower plate 108 is positioned parallel
4 and juxtaposed to the bottom surface of the mounting member 24
5 of the strut tower 14. The threaded fastener 148 has
6 sufficient length to extend through the drilled aperture 126 in
7 the mounting member of the strut tower and the upper plate 102.
8 A threaded nut (not shown) cooperates with the fourth fastener
9 to secure the upper plate in a selected position with respect
10 to the strut tower.

11 In this manner, the front wheel camber of a vehicle may be
12 selectively adjusted along an extended axis by loosening the
13 first group of three fasteners and the fourth threaded fastener
14 for movement of the upper plate, first lower plate and second
15 lower plate relative to the mounting member of the strut tower.
16 Once the plates have been positioned to cause the front wheel
17 to have the desired amount of camber the nuts are tightened by
18 means well known in the art to secure the plates and thereby
19 the wheel in place. The front wheel caster may be selectively
20 adjusted along an extended axis by loosening the third group of
21 threaded fasteners for movement of the strut mounting plate
22 relative to the upper plate and the mounting member of the
23 strut tower. The construction of the suspension tuning device

1 allows the wheel caster to be adjusted without loosening the
2 upper plate and without adjusting camber settings.

3 All patents and publications mentioned in this
4 specification are indicative of the levels of those skilled in
5 the art to which the invention pertains. All patents and
6 publications are herein incorporated by reference to the same
7 extent as if each individual publication was specifically and
8 individually indicated to be incorporated by reference.

9 It is to be understood that while a certain form of the
10 invention is illustrated, it is not to be limited to the
11 specific form or arrangement herein described and shown. It
12 will be apparent to those skilled in the art that various
13 changes may be made without departing from the scope of the
14 invention and the invention is not to be considered limited to
15 what is shown and described in the specification.

16 One skilled in the art will readily appreciate that the
17 present invention is well adapted to carry out the objectives
18 and obtain the ends and advantages mentioned, as well as those
19 inherent therein. The embodiments, methods, procedures and
20 techniques described herein are presently representative of the
21 preferred embodiments, are intended to be exemplary and are not
22 intended as limitations on the scope. Changes therein and other
23 uses will occur to those skilled in the art which are
24 encompassed within the spirit of the invention and are defined

1 by the scope of the appended claims. Although the invention
2 has been described in connection with specific preferred
3 embodiments, it should be understood that the invention as
4 claimed should not be unduly limited to such specific
5 embodiments. Indeed, various modifications of the described
6 modes for carrying out the invention which are obvious to those
7 skilled in the art are intended to be within the scope of the
8 following claims.